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Water Use in Vegetables—Cauliflower

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Edward C. Martin, Donald C. Slack, E. James Pegelow

Introduction

Cauliflower acreage has averaged approximately 4,660 acres in Arizona in the last five years. Arizona ranks second only to California in cauliflower production, with yields averaging 209 cwt./acre; for a total value of more than $35 million. As with most vegetable crops, cauliflower markets are highly volatile. Prices from 2000/01 through 2006/07 ranged from as little as $29.50/cwt. in 2000/01 to a high of $45.90/cwt. in 2001/02. Most of the cauliflower grown in Arizona is grown in Yuma County. As with most crops grown in Arizona, irrigation plays an important role in determining crop yield and quality. This is especially true for vegetable crops such as cauliflower where water stress can translate to poor yields (tonnage) or poor quality (firmness, head size, color).

Commercial Irrigation Management

Most cauliflower in the state is irrigated using furrow irrigation. Some growers utilize drip irrigation, but high start-up costs make it difficult for most growers to switch. However, it is quite common for growers to use sprinklers for germination. The use of sprinklers helps to reduce the amount of water needed for germination and reduces the potential for salts to enter the seed row and cause emergence problems. Cauliflower is moderately sensitive to salt water; therefore, an EC_e of 1.3 or less should be used for irrigation.

Cauliflower should be kept stress free throughout the growing cycle. The critical period for cauliflower is during head development. An irrigation threshold of 40% soil water deficit should be targeted to avoid water stress. If using tensiometers or resistance blocks, -40 to -60 centibars should be used to trigger irrigation. Set the tensiometer or resistance block at a depth of 18 to 24 in. This will give an accurate representation of the moisture level in the plant's rootzone.

Water Use by Cauliflower

Two graphs are given to help determine water use by cauliflower throughout the growing season. Figure 1 shows the consumptive use of cauliflower as a function of Heat Units After Planting (HUAP). The temperatures used to develop this curve were 40°F for the lower threshold and 76°F for the upper threshold. The heat units should be calculated using the sinusoidal approach developed by Snyder (1985). Information on daily maximum and minimum temperatures can be obtained from AZMET. Total heat units required for cauliflower are about 2600. Grown mostly during the winter months, this translates to a growing season of approximately three to four months, depending on the location and time of planting. Cauliflower uses approximately 17 in. of water in a season.

When determining irrigation water needs, do not forget to incorporate the irrigation system's efficiency. For example, if the irrigation system has an efficiency of 75% and the crop requirement is 2 in., you should apply 2.7 in. to make up for the system's inefficiency (2 in./0.75).

Figure 2 shows the average daily water use for cauliflower in central Arizona (Martin et al., 2001). Maximum water use by cauliflower is about 0.17 in. of water per day. This can vary depending on location and time of planting. Peak usage occurs toward the end of the growing cycle, just prior to harvest. The rootzone calculation used for water management in cauliflower is 3 ft., although cauliflower

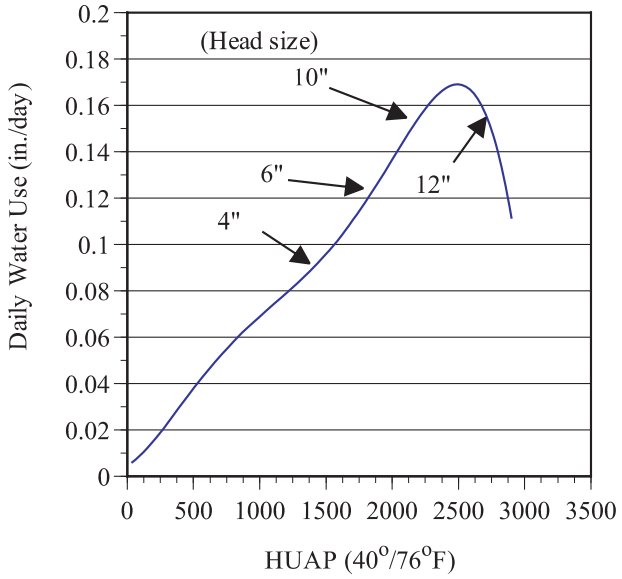

Figure 1. Average daily water use based on Heat Unit After Planting (HUAP) for cauliflower for a September 15th planting date.

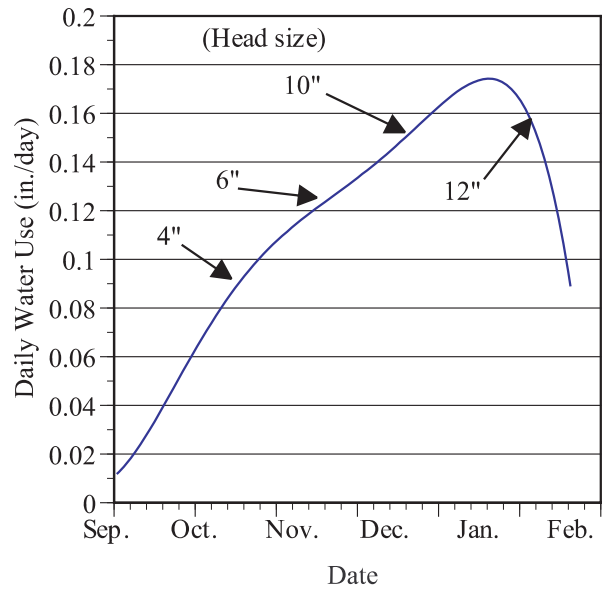

Figure 2. Average daily water use for cauliflower utilizing a calendar schedule for a September 15th planting date.

roots go deeper.

References

AZMET, Arizona Meteorological Network on the web at **http://ag.arizona.edu/azmet/**

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ARIZONA COOPERATIVE EXTENSION
THE UNIVERSITY OF ARIZONA • COLLEGE OF AGRICULTURE AND LIFE SCIENCES

The University of Arizona
College of Agriculture and Life Sciences
Tucson, Arizona 85721

Edward C. Martin, Ph.D.
Extension Irrigation Specialist

Donald C. Slack, Ph.D.
Department Head

E. James Pegelow, Ph. D.
Senior Research Specialist

Contact:
Edward C. Martin
edmartin@cals.arizona.edu

This information has been reviewed by University faculty.
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